



SNACC

SOCIETY FOR NEUROSCIENCE
IN ANESTHESIOLOGY AND CRITICAL CARE

ARTICLE OF THE MONTH

NeuroVISION Investigators. Perioperative covert stroke in patients undergoing non-cardiac surgery (NeuroVISION): a prospective cohort study

Lancet. 2019 Sep 21;394(10203):1022-1029. doi: 10.1016/S0140-6736(19)31795-7. Epub 2019 Aug 15. PMID: 31422895.

Welcome to the November AOTM! The article chosen for this month focuses on perioperative covert stroke and its implications for cognitive decline. Our commentary comes from Dr Henry Davidson and Dr. Mae Ling Chu Yap from St Vincent's Public Hospital in Melbourne, Australia.

Dr Henry Davidson (MBBS, FANZCA) is a specialist staff anaesthetist. He has also previously worked as an Associate Professor and anesthesiologist at the University of California, San Francisco (UCSF). He has a subspecialist interest in neurosurgery and neuroanesthesia, and also has committee involvement in resident education and quality assurance programs in his current role.

Dr. Mae Ling Chu Yap (MBBS, FANZCA) is a specialist staff anaesthetist. She was previously at the University of California San Francisco Medical Center where she was part of the Neuroanaesthesia team and remains as adjunct faculty. Her other interests include regional and airway anaesthesia. Dr. Yap has helped with forming the resident curriculum at UCSF and remains involved in teaching.

As always, we encourage our readers' input on this topic on the SNACC [Twitter](#) feed, or on [Facebook](#).

Amie Hoefnagel, MD, Oana Maties, MD, Shilpa Rao, MD

Commentary:

Dr Henry Davidson, Dr. Mae Ling Chu Yap
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Stroke as a complication of surgery can have a deleterious effect on patients and can result in dementia and cognitive decline. Overt strokes (ie, stroke with clinical signs) occurs in less than 1% of patients undergoing non-cardiac surgery.¹ Covert strokes (ie, stroke without clinical signs) are thought to be more common than overt strokes, and there are few methods to predict or detect them in the perioperative setting. This prospective, observational, multicenter, international study² published in Lancet in 2019 sought to address detection and underlying prevalence of covert stroke in the non-cardiac surgical perioperative population. The investigators also attempted to correlate covert stroke with the development of post-operative cognitive impairment.

Previously, there have been several studies showing that covert stroke happens not infrequently in post carotid artery procedures. However, there is no data about covert stroke in the general surgical population leading to cognitive decline postoperatively.

1114 (mean age 73 years, 57% men, 43% women) patients undergoing elective non-cardiac surgery were recruited to the study between March 2014, and July 2017. Inclusion criteria included age 65 years or older and an anticipated hospital stay after surgery of 2 days or more. Patients were excluded if they underwent carotid artery or intracranial surgery, or were unable to undertake neuro-cognitive testing due to language, vision, or hearing impairment. Those diagnosed with an overt stroke after their index surgery were also excluded. MRI in the postoperative period was used to detect covert stroke.

Primary Outcome:

1. Cognitive decline assessed at 1 year

The Montreal Cognitive assessment (MoCA) was used to detect a decrease of 2 points or more from preoperative baseline.^{3,4}

Secondary Outcomes:

2. Perioperative covert stroke

Research MRI finding of acute infarct postoperatively in patients with no clinical signs of an overt stroke

3. Delirium within first 3 days of surgery
4. Cognitive decline at 1 year follow-up based on DSST (Digit Symbol Substitution Test) and TMT-B (Trail Making Test part B)

Results:

- 1) Primary outcome occurred in 29 (42%) participants who had a perioperative covert stroke and 274 (29%) participants who did not have a perioperative covert stroke.

Covert stroke was associated with an increased risk of cognitive decline at 1 year after surgery (adjusted OR 1.98, 95% CI 1.22-3.20; $p=0.0055$, absolute risk increase 13%)

- 2) Delirium in the first 3 days after surgery occurred in 8 (10%) of 78 participants who had perioperative covert stroke and in 49 (5%) of 1036 participants who did not have perioperative covert stroke. Covert Stroke was associated with an increased risk of delirium (hazard ratio 2.24, CI 1.06-4.73, $p=0.030$, absolute risk increase 6%)
- 3) Incidence of overt stroke and transient ischemic attack was increased in patients who had perioperative covert stroke compared with patients who did not have perioperative covert stroke (HR 1.66, 95% CI 1.14-14.99, $p=0.019$, absolute risk increase 3%)

The use of proportional sampling across patient sites helped balance patient representation in this large, multicenter, international study. Covert stroke was diagnosed objectively via MRI interpreted by neuroradiologist and the results were masked to patients, clinicians and research teams which adds to its external validity. There are some limitations, including the sensitivity and specificity of cognitive screening tools in a diagnostic setting.⁵ In this ageing population cognitive decline is likely of multifactorial origin, already progressing and not entirely attributable to covert stroke, which is the main limitation. However, this study represents a significant attempt at recognizing and describing the extent of covert stroke in the elderly general surgical population. As is suggested in the manuscript, further research is needed to delineate the association between covert stroke and cognitive decline in attempts for earlier diagnosis and prevention.

References:

- 1 Mashour GA, Shanks AM, Kheterpal S. Perioperative stroke and associated mortality after noncardiac, nonneurologic surgery. *Anesthesiology* 2011; 114: 1289–96.
- 2 The NeuroVISION Investigators. Perioperative covert stroke in patients undergoing non-cardiac surgery: a prospective cohort study. *Lancet* 2019; published online Aug 15. [http://dx.doi.org/10.1016/S0140-6736\(19\)31795-7](http://dx.doi.org/10.1016/S0140-6736(19)31795-7)
- 3 Tan HH, Xu J, Teoh HL, et al. Decline in changing Montreal Cognitive Assessment (MoCA) scores is associated with post-stroke

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- 5 Stolwyk RJ, O’Neill MH, McKay AJ, Wong DK. Are cognitive screening tools sensitive and specific enough for use after stroke? A systematic literature review. *Stroke* 2014; 45: 3129–34.